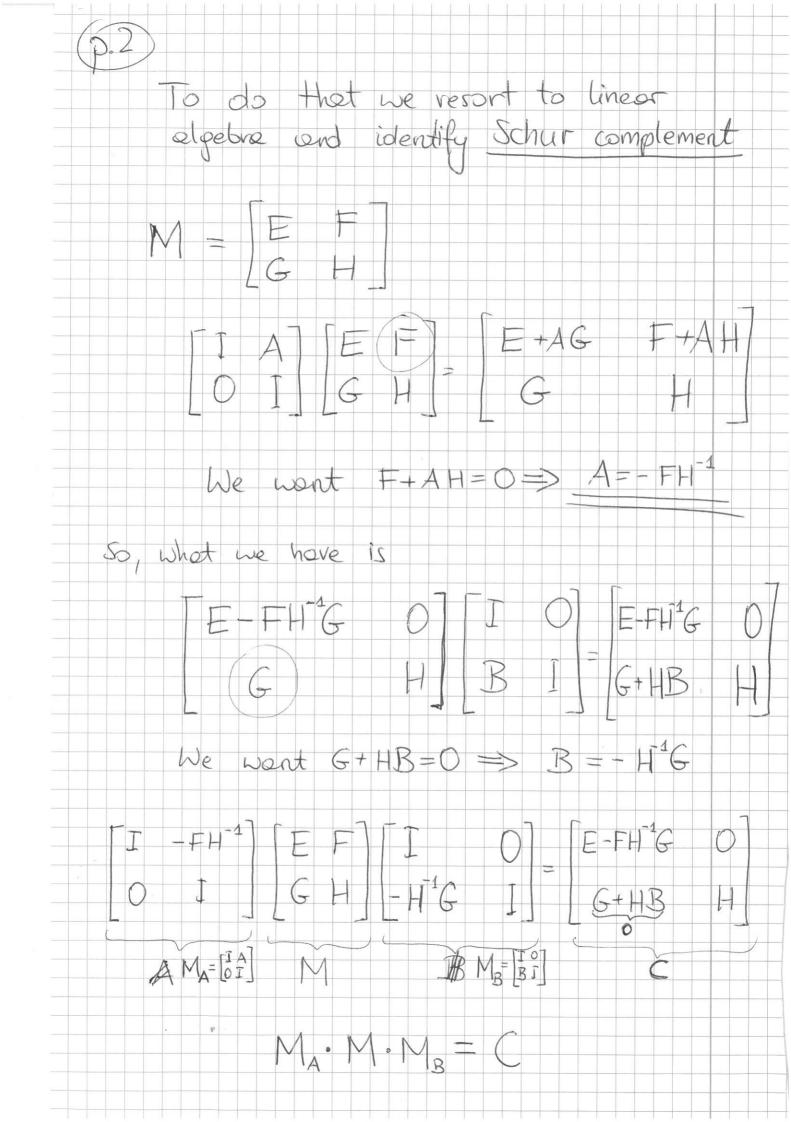
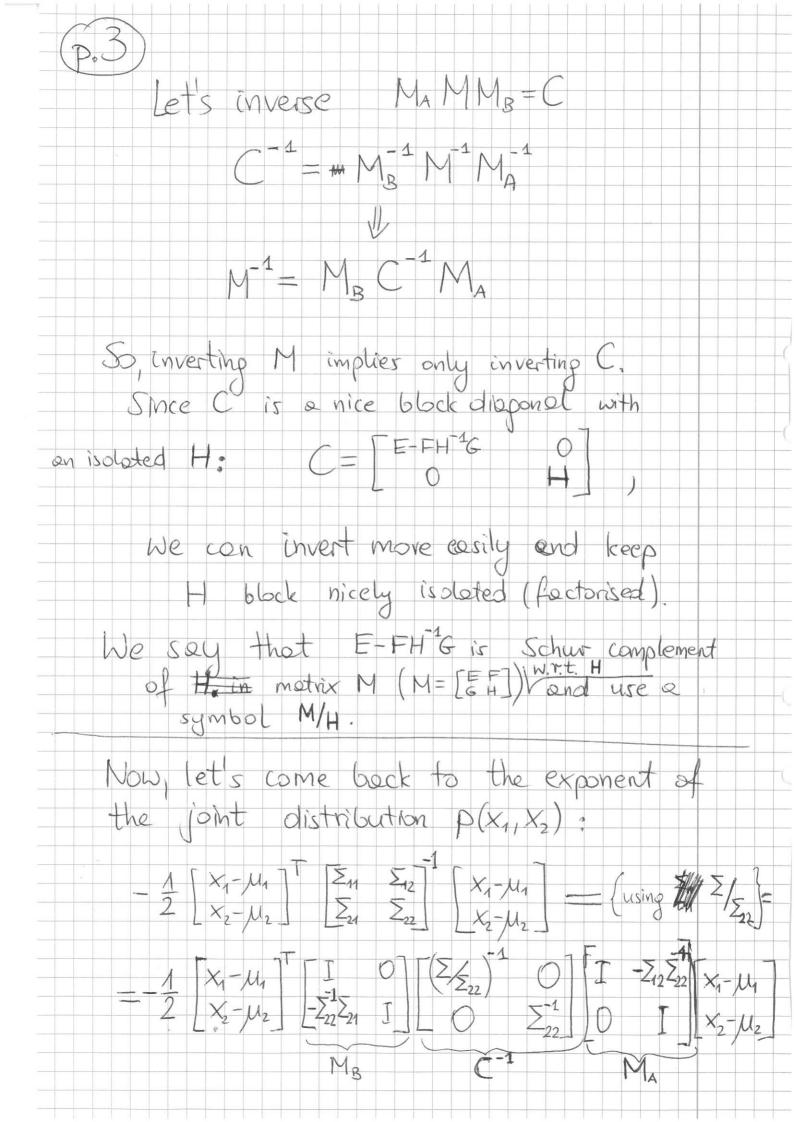
(P.1) Conditional distribution We have the joint distribution  $P(X_1, X_2) = \sqrt{\left[\begin{array}{c} \mathcal{U}_1 \\ \mathcal{U}_2 \end{array}\right]} = \sum_{11} \sum_{21} \sum_{22} \sum_{22} \sum_{22} \sum_{22} \sum_{22} \sum_{22} \sum_{23} \sum_{24} \sum_{$ X1 X2 - D-dimensional vectors From the joint, we want to find the conditional p(x1x2)=p(x1x2)p(x2) We want to factor this out from the exponent of the point distribution, since then we will pet the remaining part corresponding to the conditional - $P(X_1|X_2) = P(X_1|X_2) P(X_2)$ The Since the covariance motive gets inversed in the exponentials (Goussian John), we would ideally like to vewrite it in a way that it factorises to a block diaponal (then the inverse will spenate on the disponel blocks independently) -> How do we invert the cov, mothix to keep En isolated?





De continue with the exponent of 
$$p(x_1, x_2)$$
:

$$-\frac{1}{2} \begin{bmatrix} x_1 - \mu_1 \end{bmatrix}^T \begin{bmatrix} I & O \\ Z_{22} \end{bmatrix} \begin{bmatrix} (Z/Z_{22})^{-1} & (Z/Z_{22})^{-1} Z_{22} \\ O & Z_{22} \end{bmatrix} \begin{bmatrix} x_1 - \mu_1 \\ x_2 - \mu_2 \end{bmatrix} =$$

$$= -\frac{1}{2} \begin{bmatrix} x_1 - \mu_1 \end{bmatrix}^T \begin{bmatrix} (Z/Z_{22})^{-1} & (Z/Z_{22})^{-1} & (Z/Z_{22})^{-1} Z_{22} \\ -Z_{22} & Z_{21} & (Z/Z_{21})^{-1} & (Z/Z_{22})^{-1} Z_{22} \end{bmatrix} \begin{bmatrix} x_1 - \mu_1 \\ x_2 - \mu_2 \end{bmatrix} =$$

$$= -\frac{1}{2} \begin{bmatrix} x_1 - \mu_1 & Z_{12} & (Z/Z_{21}) & (Z/Z_{2$$

Now, let's figure out what the variance and the mean are for this Gaussian distribution:

MEAN:  $\mu_{X_1|X_2} = \mu_1 + \overline{\lambda}_{11} \overline{\lambda}_{22} (x_2 - \mu_2)$ 

VARIANCE:  $\sum_{(\text{covariance for multidimensional } x_1 \text{ and } x_2)} = \sum_{1} = \sum_{1} -\sum_{1} \sum_{2} \sum_{2} \sum_{1} \sum_{1} \sum_{2} \sum_{1} \sum_{1} \sum_{1} \sum_{2} \sum_{1} \sum_$ 

